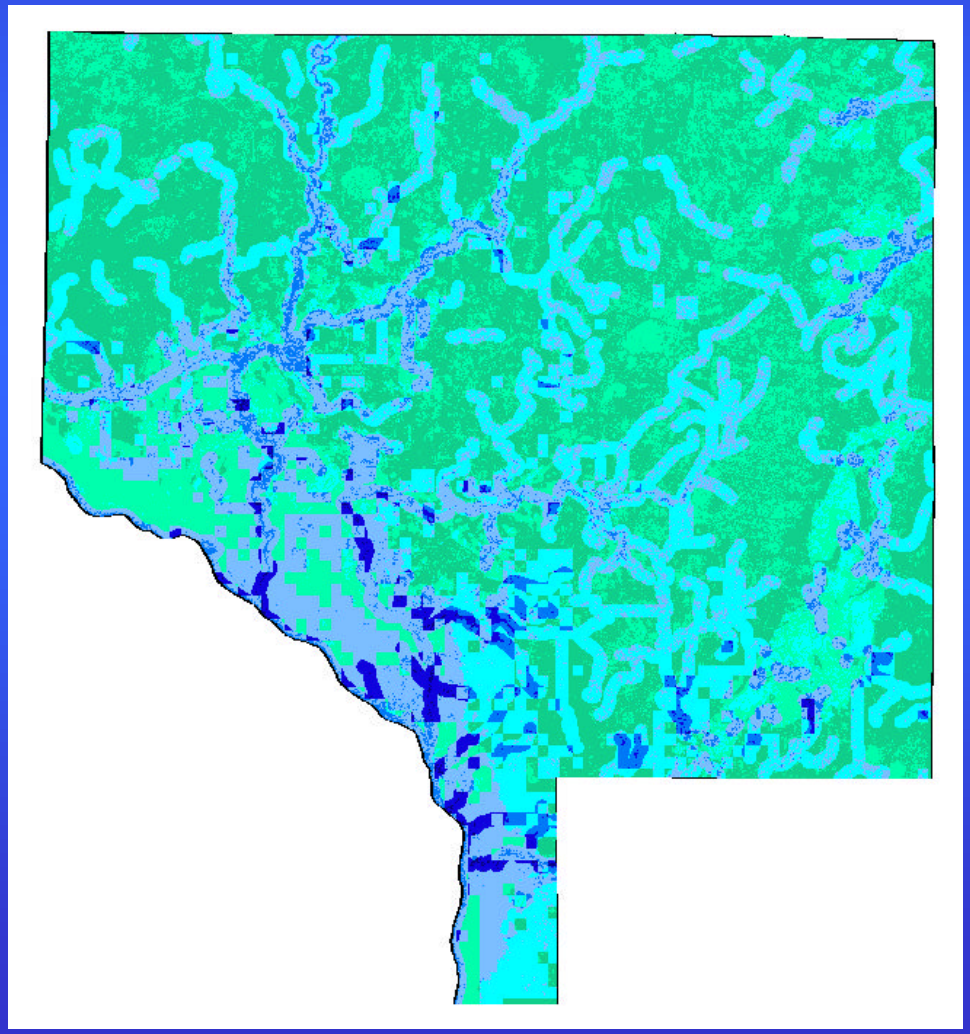
Statistical Geo-Spatial Modeling and Analysis



Presentation by Marla C. Downing

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- Kathryn W. Kromroy - Pathologist, USDA Forest Service, North Central Research Station
- Paul Castillo - Biological Technician, USDA Forest Service, North Central Research Station
- Andy Mason – Director, USDA Forest Service, Forest Health Technology Enterprise Team

Statistically Based Geo-Spatial Modeling and Analysis

What is our objective?

To spatially model some continuous or discrete variable (e.g. oak condition) in order to **understand** how it is distributed or changes across the landscape.

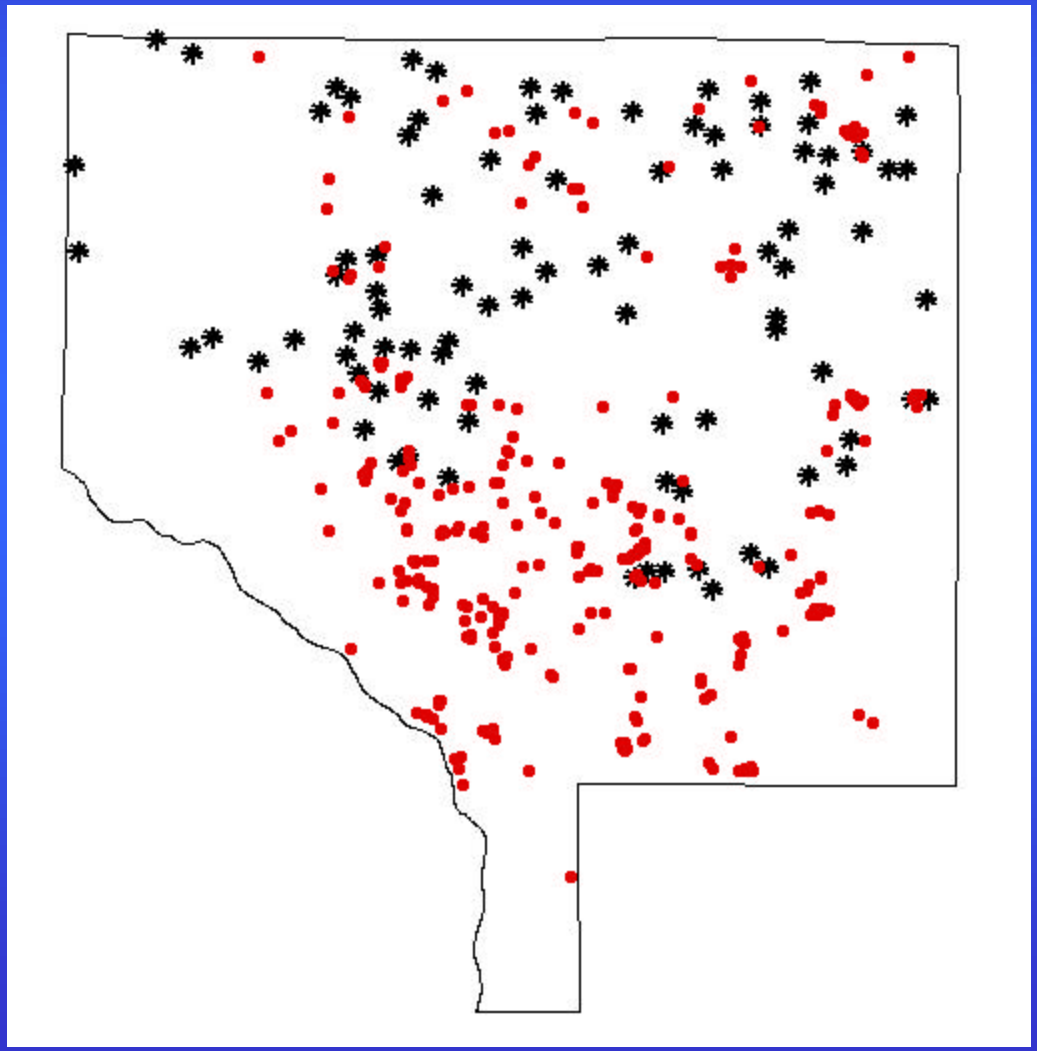
What are we trying to understand?

Is the variable of interest distributed randomly across a region, spatially independent, or does it change in a predictable manner based on another variable or collection of variables such as elevation, soils, or Landsat TM bands.

Statistical Geo-Spatial Modeling and Analysis

STEP 1 Dependent Variable: The Sample Point Theme

Each point represents a sample location that becomes the dependent variable in the spatial analysis.



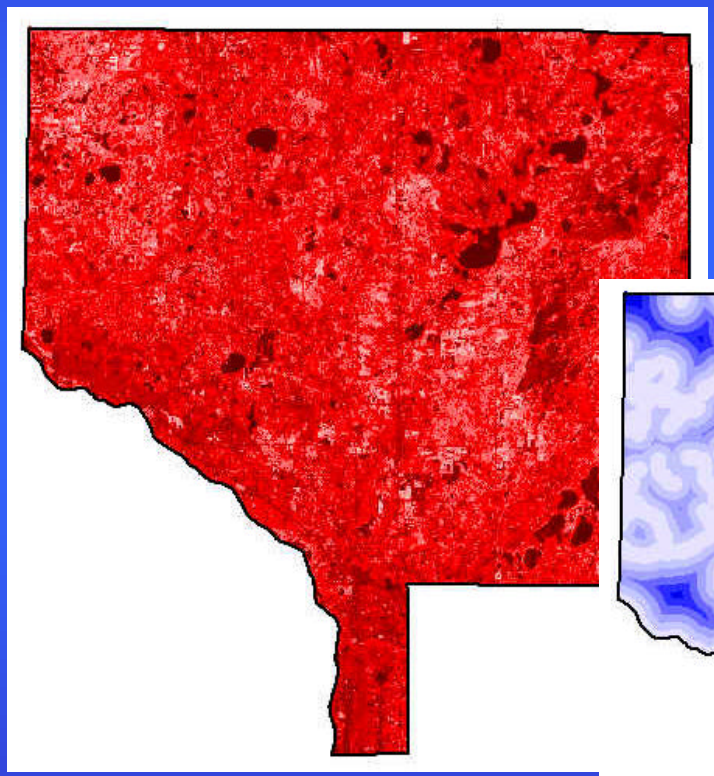
Statistical Geo-Spatial Modeling and Analysis

STEP 1 Dependent Variable: The Sample Point Theme

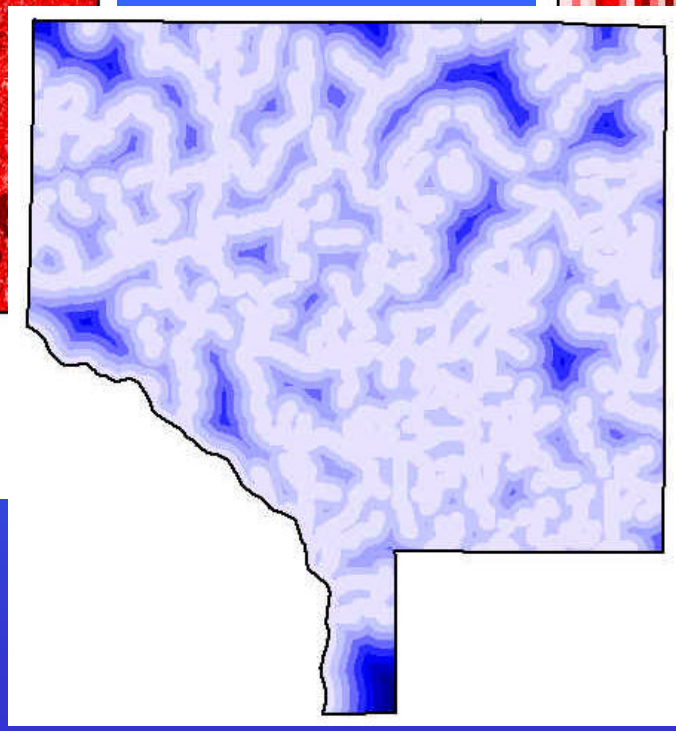
STEP 2 Independent Variables: Creating Data Themes

STEP 2

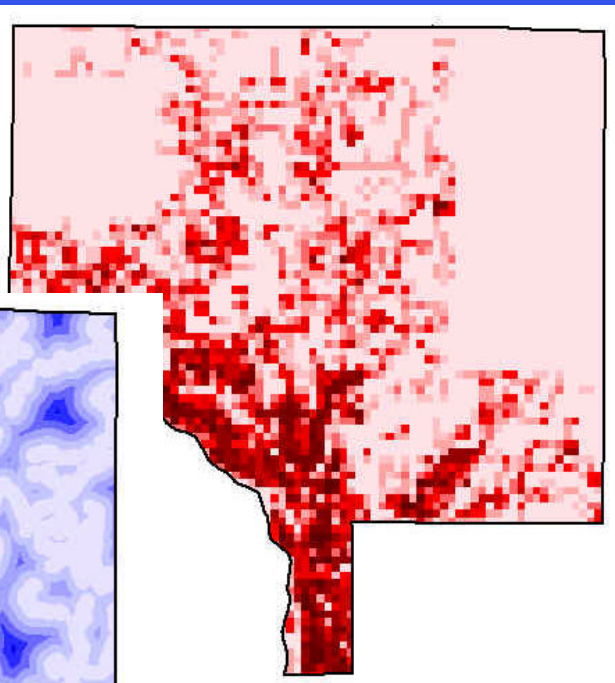
Examples of Independent Variable GRID Data Themes



Landsat TM



Distance to Streams



Road Density

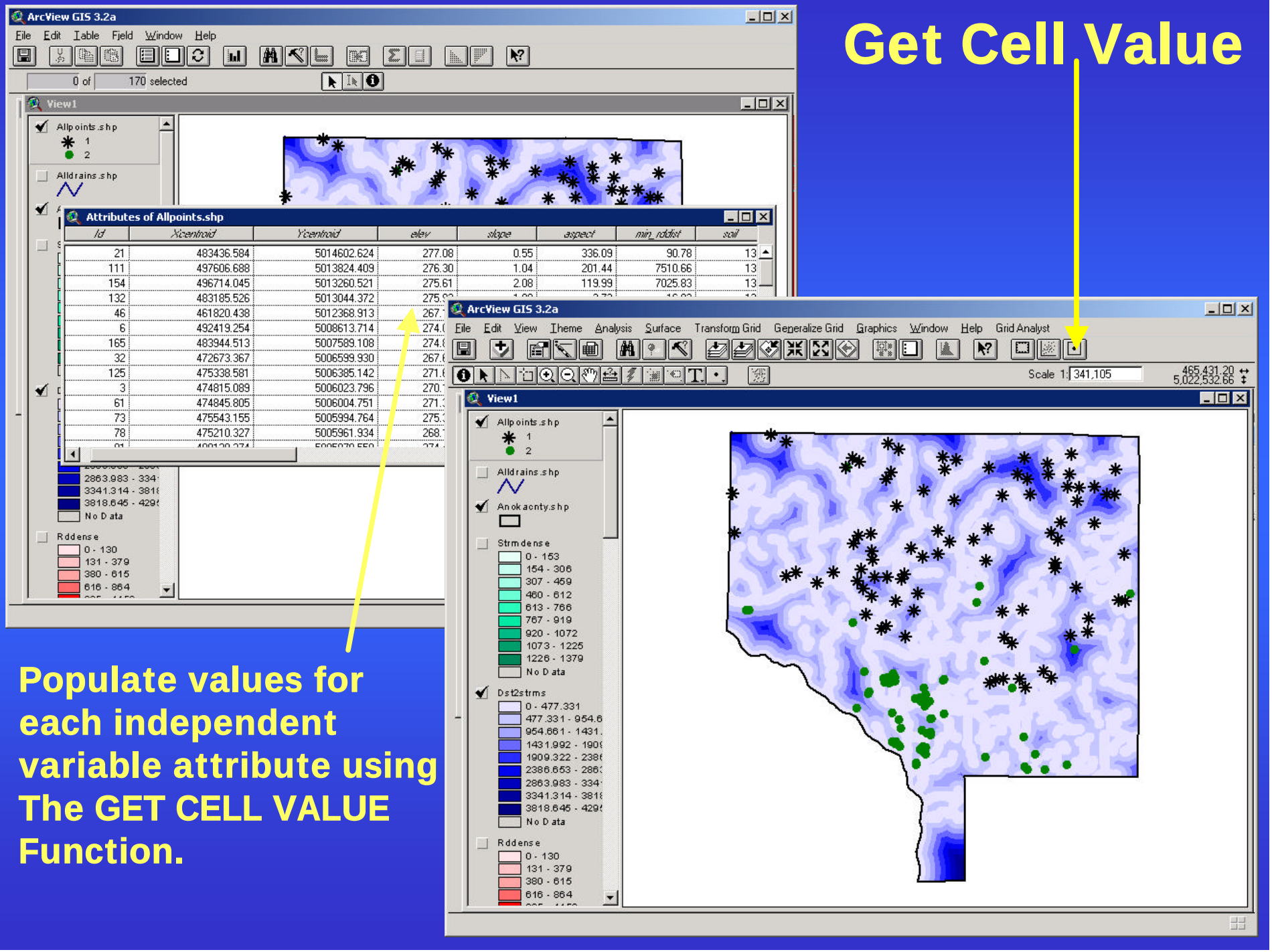
Statistical Geo-Spatial Modeling and Analysis

STEP 1 Dependent Variable: The Sample Point Theme

STEP 2 Independent Variables: Creating Data Themes

STEP 3 Create Geo-Spatial Model Spread Sheet

Get Cell Value



Populate values for each independent variable attribute using The GET CELL VALUE Function.

Statistical Geo-Spatial Modeling and Analysis

STEP 1 Dependent Variable: The Sample Point Theme

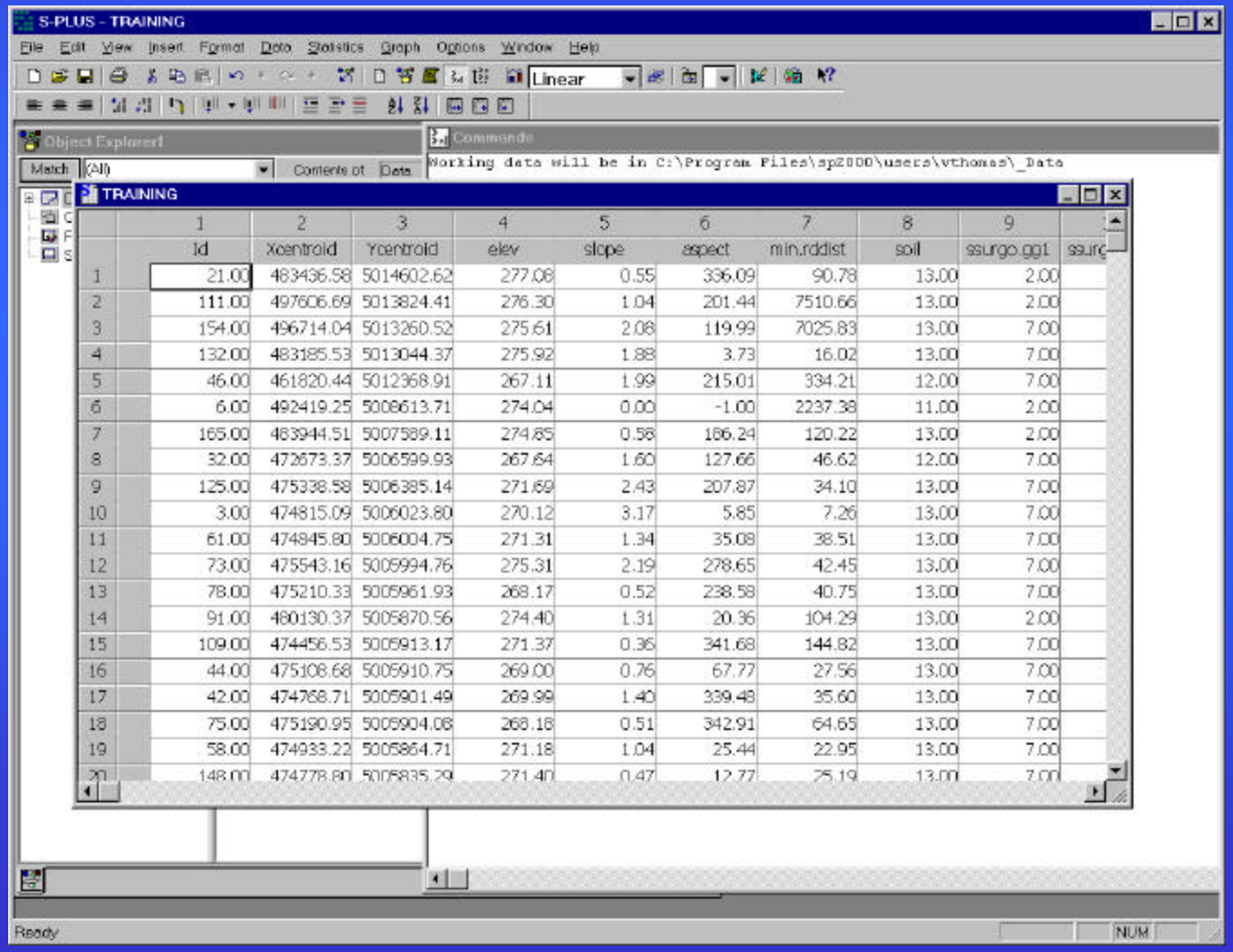
STEP 2 Independent Variables: Creating Data Themes

STEP 3 Create Geo-Spatial Model Spread Sheet

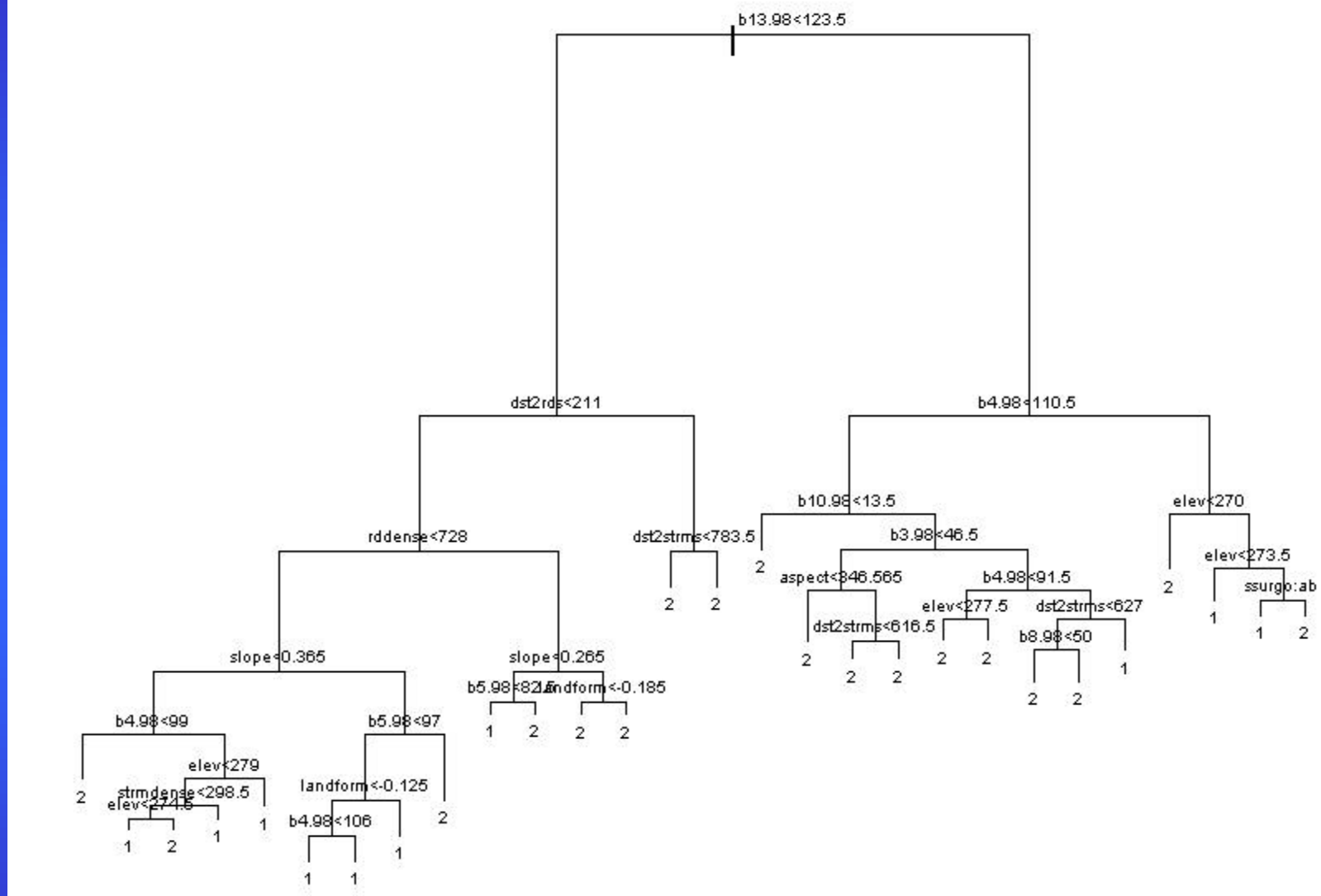
STEP 4 Spatial Analysis Using SPLUS

STEP 4

Import the Model Spread Sheet Into SPLUS



	1	2	3	4	5	6	7	8	9
	id	Xcentroid	Ycentroid	elev	slope	aspect	min.rddist	soil	ssurgo.gg1
1	21.00	483436.58	5014602.62	277.08	0.55	336.09	90.78	13.00	2.00
2	111.00	497606.69	5013824.41	276.30	1.04	201.44	7510.66	13.00	2.00
3	154.00	496714.04	5013260.52	275.61	2.08	119.99	7025.83	13.00	7.00
4	132.00	483185.53	5013044.37	275.92	1.88	3.73	16.02	13.00	7.00
5	46.00	461820.44	5012368.91	267.11	1.99	215.01	334.21	12.00	7.00
6	6.00	492419.25	5008613.71	274.04	0.00	-1.00	2237.38	11.00	2.00
7	165.00	483944.51	5007589.11	274.85	0.58	186.24	120.22	13.00	2.00
8	32.00	472673.37	5006599.93	267.64	1.60	127.66	46.62	12.00	7.00
9	125.00	475338.58	5006385.14	271.69	2.43	207.87	34.10	13.00	7.00
10	3.00	474815.09	5006023.80	270.12	3.17	5.85	7.26	13.00	7.00
11	61.00	474845.80	5006004.75	271.31	1.34	35.08	38.51	13.00	7.00
12	73.00	475543.16	5005994.76	275.31	2.19	278.65	42.45	13.00	7.00
13	78.00	475210.33	5005961.93	268.17	0.52	238.58	40.75	13.00	7.00
14	91.00	480130.37	5005870.56	274.40	1.31	20.36	104.29	13.00	2.00
15	109.00	474456.53	5005913.17	271.37	0.36	341.68	144.82	13.00	7.00
16	44.00	475108.68	5005910.75	269.00	0.76	67.77	27.56	13.00	7.00
17	42.00	474768.71	5005901.49	269.99	1.40	339.48	35.60	13.00	7.00
18	75.00	475190.95	5005904.08	268.18	0.51	342.91	64.65	13.00	7.00
19	58.00	474933.22	5005864.71	271.18	1.04	25.44	22.95	13.00	7.00
20	148.00	474778.80	5005835.29	271.40	0.47	12.77	25.19	13.00	7.00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b4.98<110.5
rddense<728
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slope<0.365
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elev<273.5
ssurgo:ab
b4.98<99
b5.98<97
elev<279
landform<-0.125
b4.98<106
dst2strms<616.5
elev<277.5
dst2strms<627
b8.98<50

Statistical Geo-Spatial Modeling and Analysis

STEP 1 Dependent Variable: The Sample Point Theme

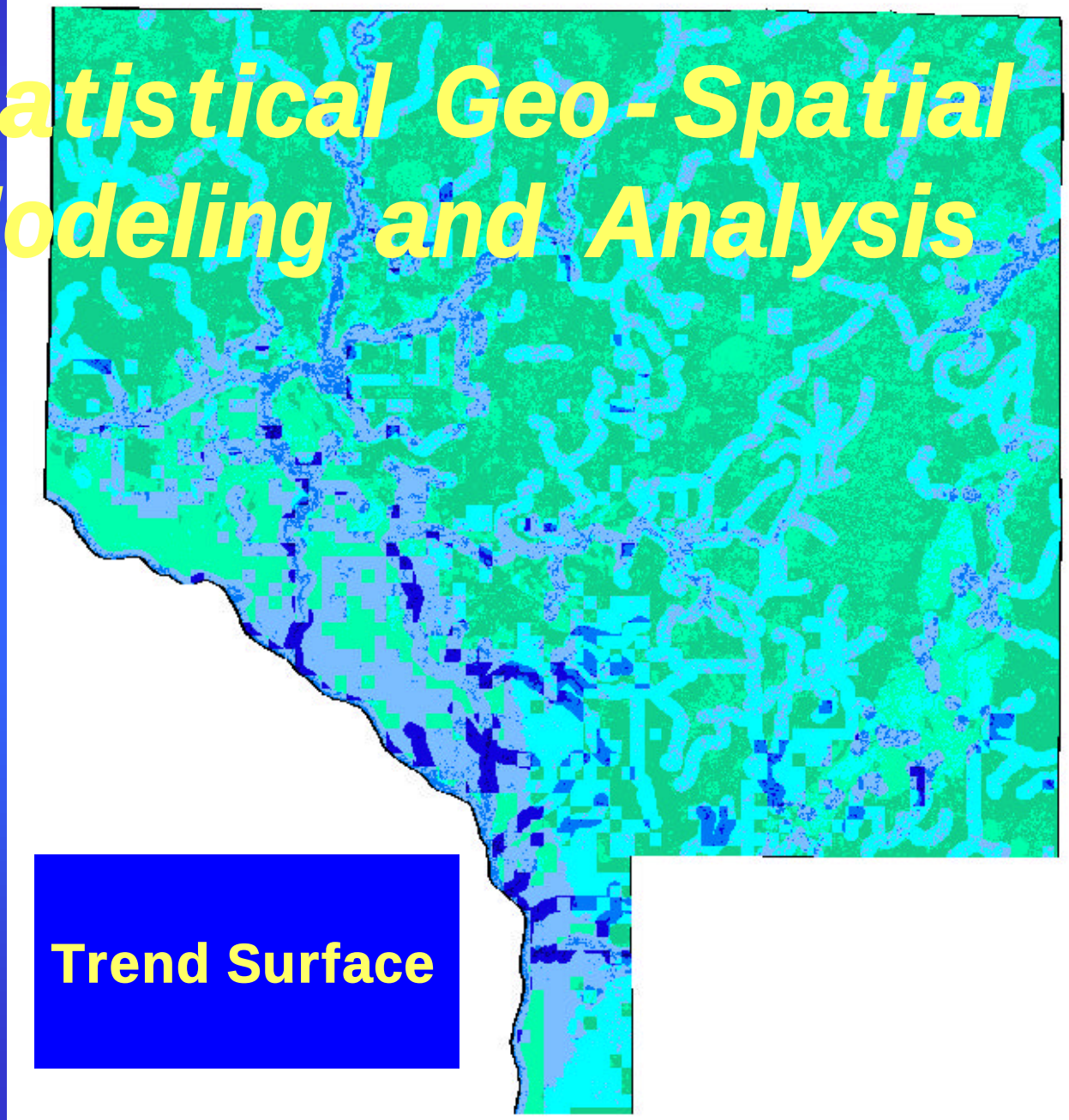
STEP 2 Independent Variables: Creating Data Themes

STEP 3 Create Geo-Spatial Model Spread Sheet

STEP 4 Spatial Analysis Using SPLUS

STEP 5 Create Dependent Variable TREND surface

Statistical Geo-Spatial Modeling and Analysis



Trend Surface

Statistical Geo-Spatial Modeling and Analysis

- This methodology uses multiple data types to classify the dependent variable of interest
- Not reliant on a single data source, such as Landsat data, which only uses spectral information
- By using more than one independent variable the overall accuracy of the classification may increase.